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WHY GROW TIMBER ?

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A FARMER who plants potatoes in the spring feels reasonably certain that potatoes will still be a staple article of diet in the fall, and that at the end of the year he can sell his crop for at least enough to pay for his own labor. If he chooses to turn to some other crop, he can do so at the end of any year without serious loss, because nearly all of his investment is in the land.

In growing forest trees the situation is different. An owner can not give up timber growing at will without considerable loss. More of his investment is in the trees themselves than in the land, and immature trees can seldom be sold at all. Before undertaking to grow timber, therefore, it is exceedingly important to have some assurance that timber will be in demand when the trees are ready for cutting.

The increasing substitution of other materials for wood in building and in a multitude of uses, the apparent rapid decrease in the per capita rate of timber consumption in the United States during the last 20 years, the very low per capita consumption of wood in the older industrial countries of western Europe—such conditions cause the timberland owner to wonder whether there is any certainty that timber will continue to be indispensable, and if it will not rather come gradually into disuse. It is the purpose of this publication to present briefly the reasons for confidence that timber will always be in great demand, and that it is to-day a profitable crop to grow.

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Why Grow Timber?

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CAN WE DO WITHOUT TIMBER?

Ever since man first picked up a wooden club to kill his prey or to fight his enemies, wood has constituted one of the principal raw materials utilized by the human race. As civilization advanced and man's wants multiplied, more and more wood was needed. It is used to-day in larger quantities and in more ways than during any previous period in the world's history.

Wood is consumed, directly or indirectly, every day by every man, woman, and child in the country. The farmer who grows our food uses wood for buildings and fences, cultivates and harvests his crops with tools and implements most of which have wooden parts, and ships his products to market in wooden boxes, barrels, or baskets, carried on wagons or trucks built partly of wood, and on railroad cars which even though made of steel yet contain some wood and run on rails laid on wooden ties.

Our dwellings are built largely of wood, and wood enters in an important way into the construction and furnishing of office buildings, stores, and factories. All of us are constantly using wooden furniture, finished with varnish containing turpentine and rosin, both forest products. Shoes are made on wooden lasts, of leather tanned by wood or bark. Some of the textiles of which clothing is made are now manufactured out of wood cellulose. All of them are woven with wooden shuttles, and rosin is an essential component of the soap with which many of them are laundered. Wood fuel cooks the food and heats the homes of millions, and wood is required in mining the coal and drilling for the oil which furnish heat and power for our industries and transportation systems.

The automobiles and other vehicles in which we move about and transport our goods all contain wood, and the metal used in their construction requires wood for its mining, manufacture, and transportation. Most of our telegraph and telephone lines and a large proportion of our electric light and trolley wires are strung on

wooden poles. The paper bags in which we wrap our groceries are made from wood, our newspapers are printed on paper made from wood fiber, and the ink used in printing them contains rosin from pine trees. In short, every important animal, vegetable, or mineral product consumed by the American people requires wood somewhere in the processes of production, distribution, or utilization. (Fig. 1.)

WOOD IS ESSENTIAL TO PROGRESS

Of course, it is physically possible to do without timber. It is also possible to do without wheat, beef, coal, gasoline, cotton, or steel. For wheat, rice may be substituted; for beef, mutton; hydroelectric plants or solar energy may replace coal as a source of heat and power; instead of gasoline we may run our cars with alcohol; silk or linen may be substituted for cotton; some combination of aluminum might conceivably take the place of steel.

It is extremely unlikely, however, that any of these substitutions will be made so long as it is possible to get the raw materials upon which we now depend. From the beginning of history, progress in material welfare and betterments in standards of living have of necessity been conditioned upon the utilization of an increasing volume and variety of raw materials. Every addition to the number of substances that can be used, and every new use to which each material can be put, marks a step forward. Even to maintain existing standards as the world's population increases in density, it becomes more and more necessary to utilize all the materials that nature provides. There is no record of an important material becoming obsolete, no matter how many substitutes may have been found for specific uses.

There are peoples, it is true, whose consumption of wood is so small that they may be said practically to do without. They are either peoples in a primitive stage of development who use very little, even though they can get it in abundance, or peoples who are able to get only extremely inadequate quantities. Examples of the first class are the native tribes of central Africa, the Malay Archipelago, and the Amazon Basin, who require very little in the way of housing, almost no fuel, and few wooden articles except primitive tools, weapons, and canoes. Examples of the second class are peoples living in countries that were densely settled and in an advanced stage of culture before the Christian era, and whose forests were practically all destroyed many centuries ago. Such countries are portions of Persia, Asia Minor, Turkestan, India, and China. In all of these, the history of forest destruction has been much the same, and its effects upon the economic and social welfare of the peoples have been strikingly similar.

THE EXAMPLE OF CHINA

A classic example of a people suffering from extreme timber shortage is furnished by northern China. Abundantly provided with forests some 2,500 years ago, the population increased rapidly and cut timber as it was needed, wastefully and without thought for the future. The Government seldom or never interfered in whatever the people were pleased to do, so long as their actions did not endanger the peace of the country. Land clearing, wasteful

cutting, and repeated fires, continuing through many centuries, gradually pushed the forests back until now they are practically confined to the least accessible parts of the mountains. To get

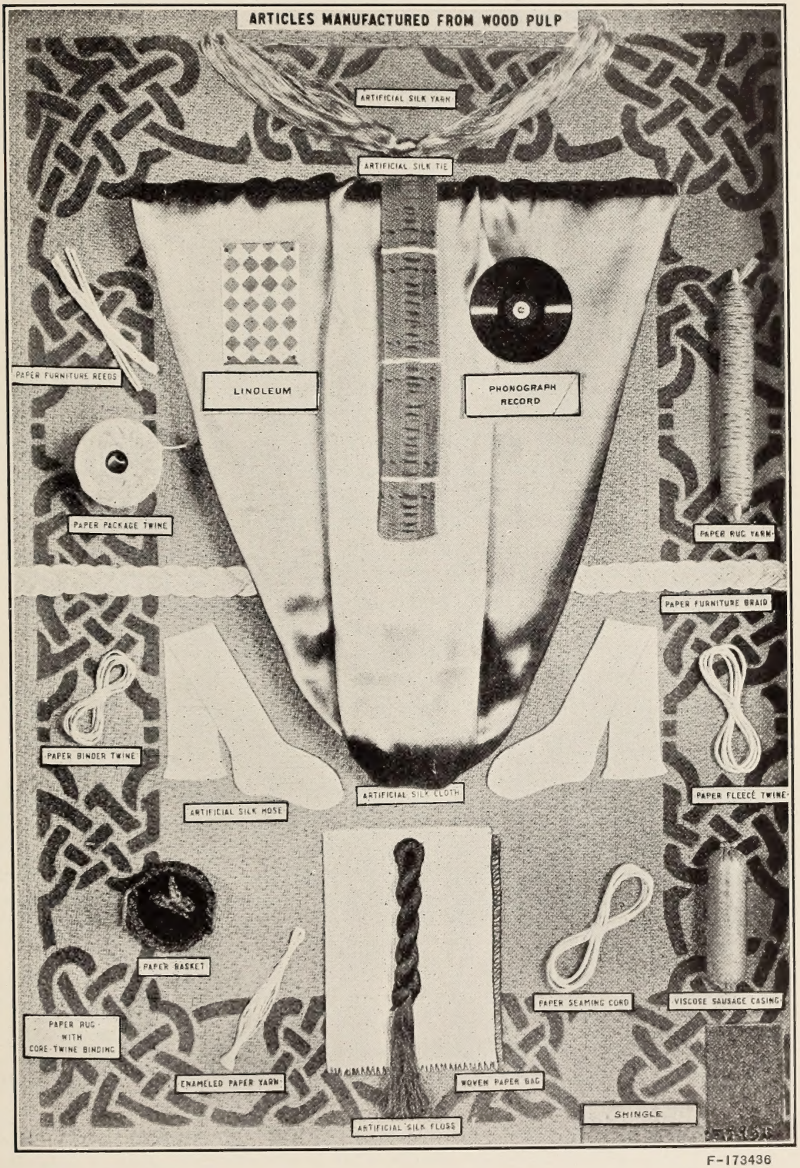

FIG. 1.—All forest products, from paper shingles to sausage casing

timber down to the principal consuming centers of the country requires from six months to three years' time and an enormous amount of manual labor, because the transportation facilities are extremely primitive. This puts the cost of timber beyond the

reach of the general public and makes it an article of luxury which only the comparatively wealthy can afford to use. In many districts, timber large enough to make boards is so scarce that practically none is used except for the manufacture of coffins. (Fig. 2.)

Since wood for building or for fuel can not be obtained, it might be expected that the Chinese would turn to substitutes, such as coal, brick, cement, and steel, for the country possesses these and other mineral resources in abundance. Without timber, however, it is impossible to utilize the substitutes. The few coal mines that are developed depend largely upon imported timbers for props, lagging, and construction material, and the railroads on which the coal is carried run on wooden ties imported from Manchuria, Japan, or North America. The small native iron foundries use charcoal brought for many miles by boats and on men's backs. Domestic iron and steel, therefore, are produced only in small quantities, and are so costly that they can hardly compete in the seaport cities with the iron and steel brought from North America and Europe.

There is no fuel with which to bake bricks; hence millions of families live in miserable huts of sun-dried or partly baked mud, with mud floors and roofs thatched with grass or straw and mud. The mud absorbs vast quantities of water during wet weather, so that sanitary conditions are exceedingly bad. The winters are long and cold, and the need for fuel correspondingly great, but the supply is utterly inadequate, and acute suffering is widespread. Men, women, and children spend months in the fall patiently gathering straw, shrubs, leaves, and even grass roots from the mountain sides for the winter's fuel. These materials seldom suffice, and in some regions the dung of domestic animals is dried and burned. Both practices affect agriculture seriously, for the one removes the vegetation which helps to bind the soil on the hillsides and the other deprives the land, already overtaxed by centuries of cultivation, of its only available source of fertilizer.

Without wood, without adequate transportation, without coal or other fuel, and with the necessity of importing at high cost not only machinery but also much raw material for industrial plants, many of the people of certain districts in China must lead a more or less hand-to-mouth existence. Depending as they do almost wholly on manual labor for producing goods as well as for transporting them, they have never been able to produce the surplus capital upon which higher standards of living must be based.

It is inconceivable that the United States can ever suffer so acutely from timber shortage. It is well to reflect, however, that as wood and its substitutes become more difficult to get, an increasing proportion of our national energy must be expended in satisfying our requirements for these materials. The production of other things must be correspondingly less, and the ultimate result will be a decrease in our total national wealth. It is just as true in this country as in China that decreasing production of goods and decreasing national wealth, in the face of an increasing population, must inevitably result in lower standards of living and general economic and social decadence.

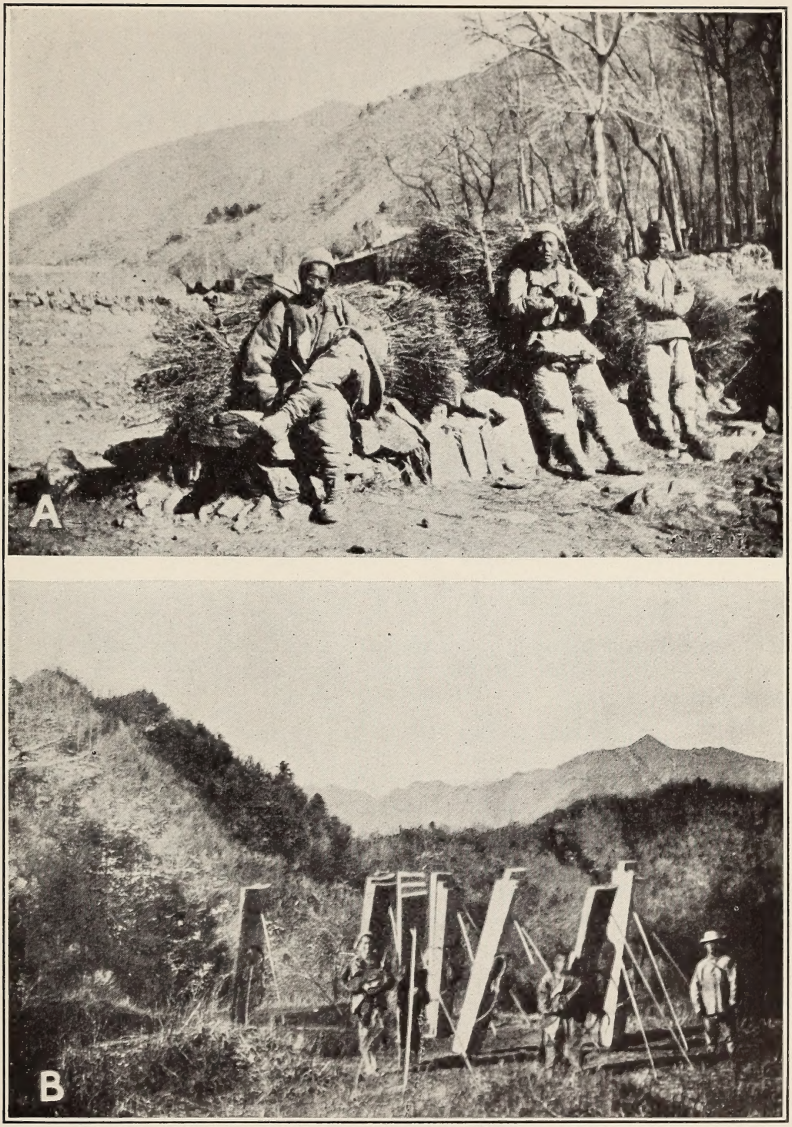

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FIG. 2.—Evidence of exhausted timber supplies. A, Brush gatherers in the mountains of Shen-si, China, each carrying 150 to 200 pounds of brush, to be sold as fuel. B, Coffin boards brought a week's journey from remote valleys of North China

THE UNITED STATES IS THE GREATEST WOOD CONSUMER

The timber requirements of the United States are far greater than those of any other country. Abundant forests, rapid growth of population, settlement of rich agricultural regions where other building materials were not available or were more difficult to obtain, tremendous development of transportation facilities, and expansion in volume and variety of manufacturing industries, all have contributed toward swelling our timber consumption. The rate of increase was especially rapid during the 50-year period preceding the World War. More recently, the growing scarcity and the increasing cost of timber, the halt in expansion of agriculture, and the cessation in railroad building have resulted in a decrease in the amount of timber used. But even though this decrease were to be permanent, the United States would still be using more saw timber than all other countries together, and more than two-fifths of the world's consumption of timber of all kinds.

Seven-tenths of the timber originally within the present boundaries of the United States has been consumed or destroyed, and such growth as has come in on cut-over lands is greatly inferior in quality to this virgin timber. Regions which were once abundantly supplied, such as the greater part of the Northeastern States, the Lake States, and parts of the Southeastern States, have been left practically destitute of high-grade timber. The end of virgin pine in the Southern States is definitely in sight, while already the younger timber is being cut as fast as it grows. Two-thirds of the remaining virgin timber and approximately one-half of all the merchantable timber in the country is concentrated in the forests of the Pacific Northwest, which now supply more than one-third of our entire lumber cut.

WE SHALL CONTINUE TO NEED WOOD

Of course we can use other materials for many purposes for which wood is used. We have been doing so for a long time, but especially during the past few years. Wood for fuel has been largely replaced by coal, gas, or oil, except in rural districts remote from these supplies. The use of steel and cement is increasing at an exceedingly rapid rate. Wooden houses are being torn down and replaced by brick and concrete. Asbestos, copper, iron, and various other materials are taking the place of wooden shingles. Steel wire has almost supplanted wooden rails for fences, and iron and concrete are encroaching upon the use of wood for posts. Office furniture is being made of steel. Steel barrels are taking the place of oak for many purposes. Wooden ships, bridges, and railroad cars are rapidly becoming obsolete.

Several factors which tend to offset this substitution are, however, often overlooked. Even if per capita consumption should fall as low as present European standards, the increase in population which is likely to take place during the next 50 years will maintain our total timber requirements at a level little, if any, below our present timber consumption.

Then, too, it should be remembered that the production or utilization of the substitutes themselves often requires wood. Practically

every ton of coal mined requires timber in the mines or at the mine mouth. The coal mines of this country alone consume a billion board feet of lumber a year. The experience of England during the war afforded most convincing evidence of the dependence of her industries upon an adequate supply of timber for her coal mines. Even the petroleum industry requires a large volume of timber for derricks. Brick and concrete dwellings as ordinarily constructed use much lumber for interior work, and a great deal of wood is required in concrete construction. Cement and steel can not be made without coal, and hence, indirectly, wood.

Another factor which tends to maintain our timber requirements at a high level is the constant broadening of the uses for wood. The manufacture of paper and other products from wood pulp, which consumed practically no wood 40 years ago, now takes the equivalent of more than 2,000,000,000 board feet from our own forests, besides an equal or greater amount in the form of imported wood, pulp, and paper. (Fig. 3, A.)

As increasing numbers of people become concentrated in urban industrial centers, and more and more food and other goods have to be shipped to greater distances, the consumption of wood, either as boards or staves or in the form of fiber board, for boxes, barrels, and crates tends to increase. In 1912 more than 5,000,000,000 board feet of saw timber was used for this purpose. (Fig. 3, B, C.)

Fifty years ago no wood was used for telephone poles and but little for telegraph lines. The manufacture of carriages and wagons, which consumed a large volume of wood, has suffered a sharp decline with the growth of the automobile industry during the last 20 years, but this decline has not resulted in lowering the consumption of wood. According to figures compiled in 1912, approximately 750,000,000 board feet of lumber was used in the manufacture of vehicles, including automobiles; in 1923 it was estimated that the automobile industry alone consumed well over 1,000,000,000 feet.

MODERN INDUSTRY DEMANDS AMPLE SUPPLIES

Except for regions of exceedingly rapid population growth, such as portions of the Central States a few years ago, and portions of the Pacific Coast States, and perhaps Florida at the present time, the highest per capita rates of lumber consumption prevail in the more industrialized parts of the country. The rate for Chicago is reported to be almost twice that for the country as a whole, and Pittsburgh uses still more. While the per capita consumption of sawed lumber for the United States apparently decreased from over 500 board feet in 1906 to 300 board feet in 1922, that for New England has been practically at a level of about 280 board feet for 50 years or more, except for a somewhat higher point just before the World War, indicating that modern industrial development is not, as is commonly supposed, normally accompanied by a decline in the rate of timber consumption.

The low rate in European countries is not the natural result of the maturity of their civilization, but is rather due to their inability to obtain sufficient timber at prices they can afford to pay. Although timber prices in the European countries are not greatly above those prevailing in some portions of the United States, they are very much

higher in proportion to what the average person has to spend. In most of the countries wood consumption has shown a marked increase during periods of industrial prosperity. Germany's per capita consumption of saw timber increased 30 per cent in the 15 years preceding the war, while Great Britain consumed more than three times as much per person in 1913 as was used 60 years before.

In our own country per capita lumber consumption more than doubled between 1860 and 1906. Its decline from 1906 to 1922 was to some extent only temporary, and was due rather to a slowing down or deferring of expansion than to less need for lumber. The net increase in railroad mileage in the 12 years 1911–1922 was less than in any previous decade since 1830. Also, the population increased more slowly during the last decade than ever before in the history of the country, and the increase in number of farms for the whole 10-year period was less than the annual increase during the 20 years preceding.

Besides this temporary slackening in requirements, the rising cost of timber, increasing at times more rapidly than the buying power of the American people, has led to a further decline in the rate of consumption. This has gradually resulted in lowered standards of housing, with attendant overcrowding, and an increased cost of housing, which takes a considerably larger proportion of the average family's income than was required 20 years ago. In 1900 31.7 per cent of all families owned their homes free of incumbrance. In 1910 the percentage had decreased to 30.8, and during the next 10 years it fell three times as fast, to 28.2 per cent. Since 1922 the per capita consumption of sawed lumber has risen from a little over 300 to approximately 325 board feet, giving further indication of the somewhat temporary nature of the rapid decline since 1906. The increase that may be expected in the buying power of the people, together with the economic pressure that will be exerted by such unsatisfactory conditions as that of lower housing standards, may be counted upon for some time to maintain our total demands for lumber and other wood products at a level above that of 1922.

WE CAN NOT DEPEND ON OTHER COUNTRIES

Heretofore, when one timber region was cut out, all that was necessary was to move on to a new one. Now, this is no longer possible without going outside the United States. It is true that there are extensive forests and large supplies of timber in Canada, Siberia, and the Tropics of both hemispheres. It is exceedingly doubtful, however, whether they will ever supply a considerable proportion of our requirements.

Canada's timber consumption is growing steadily; her eastern forests are in little or no better condition than our own, and those in the western Provinces are being drawn upon already to supply the needs of other parts of the British Empire. Timber export to the United States is more likely to decrease than to increase. Siberia's forest resources, even if they are as extensive as has been estimated, can be developed only slowly, while her growing local needs may be expected to take a large share of the output. Whatever surplus there may be will lie so much closer to the populous, timber-poor countries of Asia that very little of it will ever reach

American markets. With one exception these are the only important reserves of the softwood timber that comprises more than two-

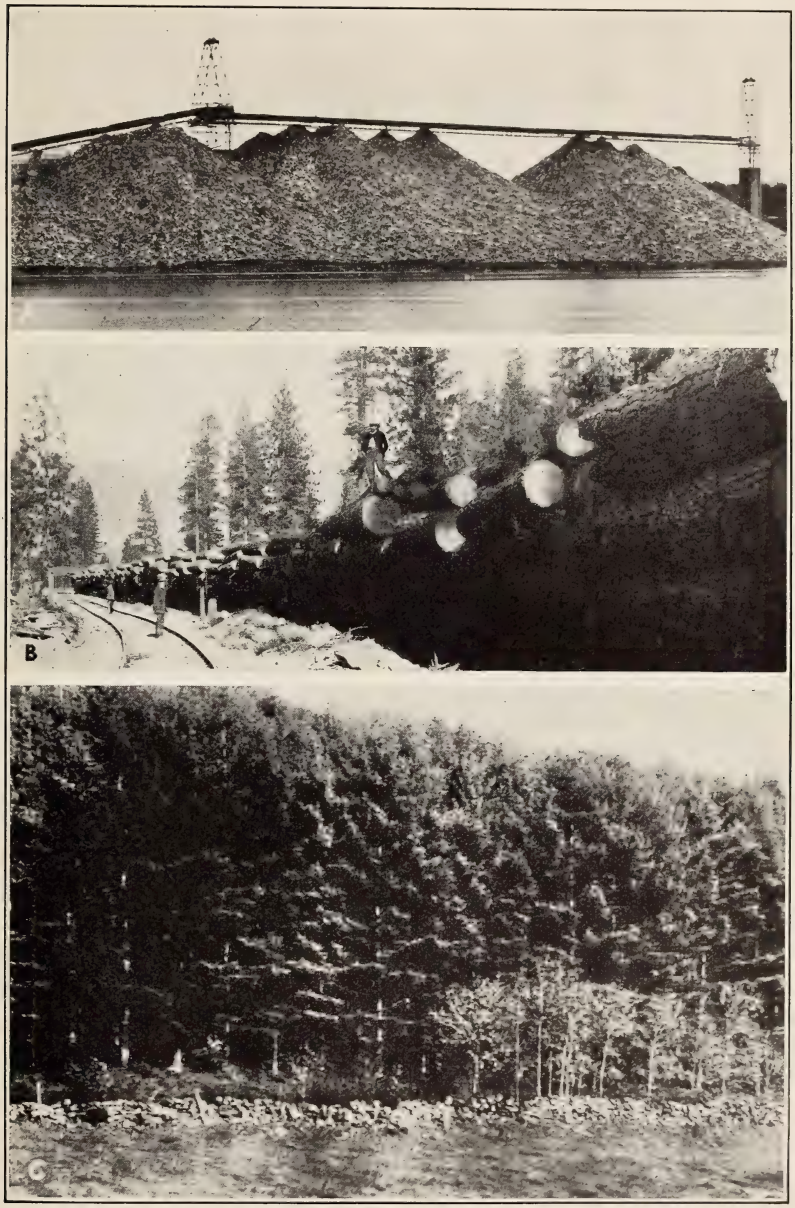

FIG. 3.—If the mills are to be kept going timber must be grown. Supplies for the hungry pulp mill, A, and the voracious sawmill, B, must be obtained sooner or later from forests so managed, C, as to produce regular crops

thirds of our present consumption. That exception is northern Europe, whose surplus is all needed by the wood-hungry countries of southern and western Europe.

The tropical forests of the East Indies, central Africa, and the Amazon will undoubtedly furnish us large quantities of timber, but mainly to replace our hardwoods in various industrial uses. While they contain timber suitable for general-construction purposes, it is generally scattered through the forest and seldom in extensive, fairly homogeneous stands comparable to the conifer forests which furnish the building material and pulp wood of the northern countries. Moreover, the timber needs of the tropical countries themselves are increasing rapidly as the other resources are developed under the stimulus of white settlement. Their accessible forests in most cases are being destroyed as recklessly as our own.

GROW MORE WOOD OR USE LESS

We must, therefore, depend largely upon our own resources. Unless we produce more timber we shall be obliged to consume less.

The drain on our forests may be reduced in two ways. In the first place, we can eliminate a large part of the waste that now takes place. In addition to the 53,000,000,000 board feet taken each year from the forest for use, there is more than 7,000,000,000 feet of standing timber destroyed by fires, storms, and widespread fungous and insect attacks. Much of this great waste could be retrieved and would have the effect of increasing the net yield. Outside of the 7,000,000,000 feet of known waste are the scattered normal losses of single trees killed by insects, fungi, or overcrowding, and the deterioration in living trees due to the same causes. These amount to a very large volume in the aggregate. More careful utilization of the trees that are cut will allow us to cut 7,000,000,000 or 8,000,000,000 board feet less, without diminishing the present rate of consumption. We utilize a much larger proportion of the wood in the tree now than was used 20 years ago, and elimination of waste by still more careful utilization and by preservative treatment of various sorts will undoubtedly go much further. All of these savings together can prolong by several decades the duration of the timber supply.

The other way to lessen the drain on the forests is to consume less wood. Because it has been so abundant and cheap, Americans have been exceedingly prodigal in their use of timber. Not only have they used it carelessly and wastefully, but it has been used in much greater quantities than was necessary, and for purposes where other materials would have given better service. Where England, France, and Germany use yearly from 150 to 200 board feet per capita of timber of saw-log size (including sawed lumber and other material), the United States used about 700 board feet 20 years ago, and still uses close to 500 board feet. As timber has become scarcer and more costly, there has been a tendency to use it more carefully and to substitute other materials where practicable, but, as has already been shown, the normal growth of population in this country will easily absorb what may be saved by more economical use even down to the standard of use prevailing in Europe. What we can save in eliminating waste and extravagant use will help us to tide over a temporary shortage of supplies but can not offer any permanent solution of the problem.

WE CAN GROW ALL THE TIMBER THAT WE NEED

The amount of food that a given number of people can consume is subject to fairly definite physiological limitations, no matter how low

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FIG. 4.—Waste land and salvaged land. The denuded and eroded land in Tennessee, A, and the Nebraska sand dunes planted with young pine, B, are suggestive of approaching dearth and the manner in which the timber needs of future generations will be met

its cost and no matter how high the standard of living. This fact, together with the present trend toward more intensive agriculture and greater production from the best soils, renders it exceedingly

unlikely that any considerable portion of the lands now classed as forest land in the United States will be needed for producing food or forage crops for many decades, if ever.

Upwards of 80,000,000 acres of land in this country—an area almost as large as the States of Ohio, Indiana, and Illinois combined—once covered with forests and now denuded, is capable of producing valuable timber crops when we are ready to expend the necessary sums for planting them. (Fig. 4.) But far more promising is the 250,000,000 acres of cut-over land more or less stocked with second-growth or culled forests, some in excellent condition. At present this land, almost equal in area to all the land devoted to cereal and cotton crops, is producing only a fraction of the timber that might be grown upon it under proper management. The practice of intensive forestry on this land will result, within a few decades, in the production of full timber crops.

The rest of our forest area still bears the stored-up growth of old timber; if this is cut according to approved methods, and the cut-over land given proper attention, the result will be that timber crops will be grown on that land also in perpetuity.

If the entire forest area of the United States, approximately 470,000,000 acres, were producing wood at the same rate as the 250,000,000 acres which are now partially productive, it would supply about one-half of our present requirements for all wood, and three-tenths of our need for saw timber. If a fairly intensive practice of forestry were applied to this area, the maximum growth that could be expected would be a little more than our present consumption. Such a maximum production could hardly be attained, however, within less than 50 years and would likely require a much longer time, even if the entire forest area could be put under intensive management at an early date. How far our timber consumption may meanwhile have to be reduced will depend upon the action that is taken in the next few years, before our remaining forests are cut off. A permanent reduction far below the present standards can be avoided if our forest lands are put to work without further delay.

Every day that this task is postponed means an added burden on the American people in increased costs of forest products. In the short period from 1914 to 1923 the annual expenditure for such products increased by approximately $2,000,000,000, with no increase in quantity. This sum is as great as the entire cost of the Federal Government in 1923 (exclusive of interest on the public debt). Directly or indirectly, this extra burden adds to the cost of living of every citizen, and if it continues to pile up the consequences may be disastrous. In so far as the increased cost has resulted from inadequacy of local supplies, it is an unnecessary burden, for we can readily produce adequate supplies if we choose.

The question, "Why grow timber?" is answered first of all by the many indications that our need for timber is not likely to decrease. As the virgin forests are more and more depleted the very factors that might cause us to use less will tend to insure prices sufficient to make timber growing a profitable undertaking.

It was not voluntary curtailment of her requirements for wood or the introduction of substitutes that brought China to the present low level of timber consumption. It was the destruction of her

forests. Yet this destruction was wholly unnecessary, and it would not have taken place had the Chinese people understood the rôle that forests play in the economic life of a nation. For the United States to follow in China's footsteps in this respect would be an inexcusable crime against future generations. For, unlike coal, iron, and most minerals, timber can be renewed like any other crop after the original supply has been consumed. Moreover, it is renewed largely by natural forces which in proportion to the effort expended produce greater values than any other use of many million acres of land. Promptness in utilizing these forces will prevent the conversion into idle, nonproductive wastes of great areas capable of yielding continuous crops of timber.

We must grow timber because nature unaided will not grow it for us in sufficient quantities, nor can the deficiency in our supplies be made up from sources outside our country. It is immediately urgent that full timber crops be grown wherever cut-over land is available for this purpose. It is of vital interest, not only to the landowner, the timber operator, or the manufacturer of forest products, but to every citizen who in one way or another has already felt the first effects of the timber shortage which improvident and unregulated exploitation of our forest resources is bringing upon us.

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